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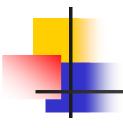
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Self-efficacy

- "a cognitive process in which people construct beliefs about their capacity to perform at a given level of attainment" (Bandura, 1977)
- "belief in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997)
- "influence on how much effort people put forth, how long they will persist in the face of obstacles, how resistant they are in dealing with failures, and how much stress or depression they experience in coping with demanding situations" (Tschannen-Moran et al., 1998)



Personal Teaching Efficacy

Teacher's confidence that his or her individual abilities and efforts as a teacher can reach "even the most difficult or unmotivated students"



Teaching Outcome Expectancy

 Teacher's belief about whether environmental factors have a greater influence on students' motivation and performance than do teachers



Personal Environmental Teaching Efficacy (PETE)

 Belief in one's ability to teach environmental education effectively

 An individual's belief that one has the ability to effectively perform environmental education teaching behaviors



Environmental Teaching Outcome Expectancy (ETOE)

 Belief that students can learn environmental education facts external to the teacher

 Belief that effective environmental education teaching will have a positive effect on student learning



Ethnicity

- "the ethnic group or groups that people identify with or feel they belong to."
- "A social group whose members have one or more of the following four characteristics:
 - they share a sense of common origins
 - they claim a common and distinctive history and destiny
 - they possess one or more dimensions of collective cultural individuality
 - they feel a sense of unique collective solidarity."
 (Smith A. 1981)



Research Questions

- What effect did participation in the GLOBE curriculum have on personal environmental teaching efficacy and outcome expectancy of elementary preservice teachers?
- Is ethnicity a construct that influences personal environmental teaching efficacy and outcome expectancy?



Participants

- Control group: elementary pre-service students enrolled in an Earth and Life Science Lab
- Experimental group: elementary preservice students enrolled in an Earth and Life Science lab, using the GLOBE curriculum as a framework for the lab



Experimental Treatment

 Three sections out of seven of Earth and Life Science labs used GLOBE curriculum as the conceptual framework for a revised course in Earth Systems Science



Instrument

- Environmental Education Efficacy Belief Instrument (EEEBI) (Sia, 1992)
- Modified from Science Teaching Efficacy Beliefs Instrument (STEBI) (Enochs and Riggs, 1990)



Methodology

 Pre-test EEEBI given to control and experimental groups at beginning of semester

 Post-test EEEBI given to control and experimental groups at end of the semester



Results Control group-Experimental group

Independent samples t-tests revealed:

PETE

- * Significant difference between control pre and experimental pre (t_{111} =-3.953, p = .000)
- * No significant difference between control post and experimental post (experimental means higher)

ETOE

- * No significant difference between control pre and experimental pre (control means higher)
- * No significant difference between control post and experimental post (experimental means higher)



Group differences for the subscales of the EEEBI-B prior to and after integrated content course.

| | Control Group | | Experimental Group | | | | | | 95% Confidence Interval of the Difference | |
|-----------|---------------|------|--------------------|------|-------|-----|-------|--------------------|---|--------|
| Variable | M | SD | M | SD | t | df | p | Mean Difference | Lower | Upper |
| PETE | | | | | | | | | | |
| Pre-test | 44.80 | 5.86 | 49.16 | 5.49 | -3.95 | 111 | .000* | -4.362 | -6.548 | -2.175 |
| Post-test | 47.89 | 5.89 | 49.28 | 4.16 | -1.39 | 100 | .167 | -1.393 | -3.377 | .591 |
| ETOE | | | | | | | | | | |
| | | | | | | | | | | |
| Pre-test | 36.54 | 4.89 | 35.49 | 4.16 | 1.172 | 109 | .244 | 1.056 | 730 | 2.842 |
| Post-test | 36.88 | 4.85 | 37.73 | 4.69 | 872 | 100 | .385 | 852 | -2.792 | 1.088 |

^{*}p < .05



Results Control Group Pre-Post

Significant increase in PETE (t = -2.58, p = .011)

No significant increase in ETOE



Results Experimental Group Pre-Post

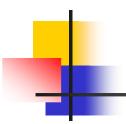
No significant increase in PETE

Significant increase in ETOE
 (t = -2.54, p = .012)



Independent samples t-tests

| | Pre-Test | | Post-Test | | | | | | 95% Confidence Interval of the Difference | |
|--------------|----------|------|-----------|------|-------|-----|-------|--------------------|---|-------|
| Variable | M | SD | M | SD | t | df | p | Mean Difference | Lower | Upper |
| Control | | | | | | | | | | |
| PETE | 44.80 | 5.86 | 47.89 | 5.89 | -2.58 | 104 | .011* | -3.095 | -5.466 | 723 |
| ETOE | 36.54 | 4.89 | 36.88 | 4.85 | 335 | 103 | .738 | 334 | -2.310 | 1.642 |
| Experimental | | | | | | | | | | |
| PETE | 49.16 | 5.49 | 49.28 | 4.16 | 139 | 107 | .892 | 126 | -1.961 | 1.710 |
| ETOE | 35.49 | 4.16 | 37.73 | 4.69 | -2.54 | 106 | .012* | -2.242 | -3.992 | 493 |



Results Ethnicity as a construct

- When group was accounted for, there was no significant differences for PETE based on ethnicity, prior to and after treatment
- When group was accounted for, there was no significant differences for ETOE based on ethnicity, prior to and after treatment



Results of 2 x 2 Factorial Analysis of Variance Personal Environmental Education Teaching-Efficacy and Environmental Education Outcome Expectancy

| Source | df | F | $\acute{\eta}^2$ | p |
|----------------------------|----|-------|------------------|------|
| Outcome Expectancy: | | | | |
| Group | 1 | 2.848 | .035 | .095 |
| Ethnicity | 1 | 2.805 | .034 | .098 |
| Group × Ethnicity | 1 | 2.088 | .026 | .152 |
| Error | 79 | | | |
| Personal Teaching Efficacy | | | | |
| Group | 1 | 2.542 | .031 | .115 |
| Ethnicity | 1 | 1.430 | .018 | .235 |
| Group × Ethnicity | 1 | 1.043 | .013 | .310 |
| Error | 79 | | | |

Note. Values enclosed in parentheses represent mean square errors.

^{*}p < .05



Conclusions

Between groups:

GLOBE curriculum did not significantly influence preservice teachers' personal environmental teaching efficacy and outcome expectancy (post experimental means higher in both)

Among groups:

GLOBE participants (experimental group) increased significantly in ETOE

Non GLOBE participants (control group) increased significantly in PETE



Conclusions

 Ethnicity was not a significant construct in influencing personal environmental teaching efficacy and outcome expectancy



Discussion

- Do pre-service teachers know what environmental education is?
- Is GLOBE an environmental education curriculum?
- What is, in fact, environmental education curriculum, especially in the context of teacher education?



Implications to Teacher Education

 Teacher educators need to be explicit in the objectives and delivery of environmental education activities and curriculum with pre-service teachers



Future Research

- How do pre-service teachers define environmental education?
- How do pre-service teachers define environment?
- What other factors of ethnicity...culture, gender, geographical background, i.e... influence environmental teaching efficacy and outcome expectancy?